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Although the work of COPERNICUS led to great results, yet his methods were not scientific. Astronomy, indeed, had hardly yet become a science. It might, perhaps, have been rightly called mathematical speculation. The deductive method of mathematics was used. Axioms were assumed, and the consequences deduced by processes of reasoning. It had not yet been perceived that the true method of scientific research is an inductive one. Observations must first be made and facts ascertained. The theory must be in accord with the facts. If this is not the case, then the theory is certainly false. If the theory does satisfy the facts, then it may be true. We shall see in the next paper how the great Danish astronomer was the first to perceive and carry out true and accurate methods of scientific research.

In criticising and pointing out defects in the work of COPERNICUS, I do not wish the reader to think that I underestimate his work. The defects belonged more to the age than to the man. His work was profound, it was epoch-making; still he was not by any means a genius; things did not come to him by inspiration. He was a quiet, deep, incessant thinker, earnest in his belief and fearless in its expression. History has always given, and I think always will give, COPERNICUS a place among the great men of the world.

(To be continued.)

A CLUSTER OF METEORS.

BY SIDNEY D. TOWNLEY.

On Friday evening, 1899, April 7th, at about 8:45 o'clock P. S. T., a very peculiar appearance of meteors was observed at the Students' Observatory of the University of California. While I was looking at the constellation of *Orion*, a whole "flock" of very faint meteors appeared at the same instant, some six degrees to the southeast of α *Orionis*, about in the head of the Unicorn. They were moving northwest, slowly, about parallel to the horizon, and remained visible not more than a second. The "flock" was about one and a half degrees wide, and the path two or three degrees in length. None of the meteors were brighter than a fifth-magnitude star. It was impossible to make an accurate

estimate of the number; there might not have been more than ten, yet, on the other hand, there might have been a hundred.

The phenomenon was witnessed by several other persons. It was public night at the observatory, and after looking at the nebula of *Orion* with the equatorial, we had stepped outside the observatory in order that I might point out to the visitors the location of the nebula. I had just pointed to the constellation, when all exclaimed at once upon the appearance of the meteors. Several other meteors moving in the same general direction were noticed during the evening, but no attempt was made to locate them accurately. From my recollection of their general direction, I should say that the radiant was somewhere in the neighborhood of the constellation *Aries*.

BERKELEY, CAL., April 9, 1899.

PLANETARY PHENOMENA FOR JULY AND AUGUST, 1899.

BY MALCOLM McNEILL.

JULY.

Mercury is an evening star throughout the month, and until the last week it sets more than an hour after sunset, so that it can probably be seen on almost any clear evening in the western twilight. It reaches its greatest eastern elongation on July 22d, and after that date it rapidly approaches the Sun.

Venus is still a morning star, but the interval between its rising and sunrise is growing smaller, and at the end of the month is only a little more than an hour. There will, however, be no difficulty in seeing it in the morning twilight, as the planet is much brighter than *Mercury*. It moves 41° eastward from *Taurus* to the extreme eastern part of *Gemini*.

Mars is still above the horizon in the early evening, but has ceased to be a conspicuous object. It moves 17° eastward and 8° southward from *Leo* into *Virgo*, and on the evening of July 29th passes very close to the third-magnitude star β *Virginis*, the distance being a little greater than the limit of naked-eye separability. At the close of the month the planet's distance from the Earth is more than double the Earth's distance from the Sun.